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Fall Creek Falls State Park's Natural Diversity

By Stuart Carroll

Known for its waterfalls, stunning vistas, and plush amenities, Fall Creek Falls State Park's diversity of plant and animal life is just coming to light.

It is a diversity that both surprised the researchers and has park staff scrambling in an attempt to further inventory and adequately manage this resource of plant and animal life.

That Fall Creek Falls should have such a large number of native plants and animals is not too surprising considering its diverse landscape with sandy, dry upland ridges atop the Cumberland Plateau; the richer forest of the plateau proper; and the incredible topographic changes found around its waterfalls and canyons.

The dramatic topographic variation is a huge stimulus for the large number of species found throughout the park. You can roughly track the different forest associations by starting in Fall Creek Falls' highest locations and then dropping down to the lowest. You can find the Blackjack Oak and Virginia Pine in the upper ridges. The plateau proper is associated with oak, hickory, and maple. Virginia Pine wreaths the bluff edges of the canyons. Chestnut Oak stands immediately below the bluff and there are almost pure stands of Hemlock in the narrow gorges. Hemlock, Buckeye, Basswood, and Yellow Birch can be found in the wider gorges. Oak,

Tulip Poplar, Black Cherry, and other species are found where the gorge widens out even further.

Chris Fleming, a researcher from the University of Tennessee, identified 879 species and subspecies of vascular plants in the park, making it one of the most diverse plant areas in Tennessee, comparable for its size with Great Smoky Mountains National Park. Fleming also divided the forest that covers the park into 17 different associations

There are a lot of other reasons for this diversity of species besides simple topographic variation. The eastern two-thirds of Tennessee has been out of the ocean for millions of years. Also, the mountains of East Tennessee trend north and south, not east and west (as in Western Europe), so that plants could retreat southward during periods of glacial advance (the ice ages), and then move back north during warming periods.

It is also important to recognize that the park is atop the Cumberland Plateau, which has sandstone as its basic rock. Sandstone breaks down into a thin, sandy, slightly acidic soil. But in the canyons of the park, the substrate is limestone, which produces much more fertile, clay-rich, alkaline soil and is home to different plant communities than the top. The microclimates that this heavily sculpted land creates include mist zones around waterfalls; cool seeps at the bottoms of bluffs; and moisture and species-rich sinks around some cave entrances and in the limestone bottomlands.

It doesn't hurt this diversity of species that much of the park has been preserved since 1935. When Fall Creek Falls was first set aside as a park in 1935, a lot of the farms were allowed just to revert naturally. These farms came up in thick stands of Virginia Pine, and in some places American Holly. Today, if we allowed a farm to grow up naturally, it would probably come up in Multiflora Rose, Autumn Olive, Japanese Honeysuckle, and Ailanthus. However, those invasive exotics were not as widespread in 1935. Also, the creator of the park, the National Park Service, took a very protectionist stance toward the park's resources. As one person who worked here at the time said: "The National Park Service wouldn't let you turn over a rock without asking first!" That is an exaggeration of their stance, but by not allowing for widespread disturbance of the soil, it protected the native plants, and gave the invasive exotic plants no chance to get started.

At Fall Creek Falls, researchers and their fields of study include: Chris Fleming, who worked on documentation of the park's vascular plants; Keith Bowman, who studied the park's nonvascular plants; and Dr. Julian Lewis and company, who documented the park's cave animals. Others have fleshed out the startling list of plants and animals the park contains. There is still much work to be done to fully document all of the species found in the park. Once the inventory work is done, the management aspect begins.

Let's look at two "systems" in the park, and some of the associated diversity.

Cane Creek, Life Blood of Fall Creek Falls

It is often said that the creeks and rivers are the lifeblood of an area, and the health or sickness of those creeks are indications of the health or sickness of the whole area. This is the case with Cane Creek, the main watershed of Fall Creek Falls State Park. The park's other creeks: Dry Fork, Camps Branch, and Piney, have all, in varying degrees, been affected by the acid mine runoff that is common from abandoned strip mines throughout the plateau. However, because there has not been a lot of unregulated strip mining in the upper drainage of Cane Creek, the creek has largely avoided some of the heaviest impact of these abandoned mines.

Cane Creek begins south of the park, heading north with waters that will eventually join the Caney Fork and the Cumberland River, amazingly avoiding the Tennessee River drainage. Almost immediately after entering the park, it provides habitat for the federally listed Virginia Spiraea. In fact, some of the largest populations in existence occur on the flood scoured cobble bars in the park. This abundance of the Virginia Spiraea along Cane Creek, and its absence in the other major drainages and the presence of the Japanese Spirea is unexplained: could it be due to the strip mine runoff, changes in water flow, or simply the fact that in disturbed areas the Japanese Spiraea can out-compete the native Virginia Spiraea?

As Cane Creek continues northward toward its confluence with the Caney Fork, it goes over Cane Creek Cascades, then Cane Creek Falls. At high flows, and at certain phases of the moon, Cane Creek Falls displays a beautiful moonbow, the night time version of the rainbow, said (falsely) to only occur in two other areas of the world. Just as neat as the moonbow is the fact that on the north facing bluff beside Cane Creek Falls — and watered by the mist of the falls — grows a diminutive version of Northern White Cedar. This plant occurs as a large tree in Canada, but adapting to the rough conditions of the bluff, and watered by the falls, it occurs here in a population of dwarf individuals. This population of Northern White Cedar, bonsai-like in growth, contains some individuals that researcher G.L. Walker from U.T. has ascertained to be around 500 years old.

North of Cane Creek Falls, as the creek enters the deep part of Cane Creek Gulf, part of Cane Creek's water starts disappearing via sinks or "swallets" into underground passages. Traveling underground for miles, the water itself is buffered by the limestone it travels through. When it reemerges aboveground in the large spring that is locally known as the "Crusher Hole," it is a cold 56-60 degrees year round, and its pH has been raised to around a neutral 7.

From then on a surface stream, but transformed, it nurtures a different aquatic community than found on top of the plateau, including three federally protected species: the Little Winged Pearly Mussel, the Cumberland Pigtoe (also a mussel), and the Bluemask Darter.

The air above the creek may also be instrumental for the survival of the Indiana Bat, one of the most endangered bats in existence. The Indiana Bat is dependent on foraging for insects above creeks, such as Cane Creek. For this healthy insect population to occur, the tree cover and shade that normally lines the creek bank must stay intact, not be cleared away, as you will sometimes find in urbanization, or when people build houses along creeks. In this area, Tennessee Wildlife Resources Agency regularly stocks Cane Creek with Rainbow Trout.

Cane Creek flows on northward, leaving the park a short distance north of the Crusher Hole. It flows about seven more miles before hitting the slack water of the Great Falls Dam at Rock Island.

The Caves of Fall Creek

Although home to just a fraction of the overall species you will find above ground, the caves of Fall Creek, are nevertheless, home to some of the rarest. Cave adapted millipedes, flatworms, isopods, copepods, amphipods, crayfish, spiders, and other invertebrates are found in the park's caves. The one obligate vertebrate species is the Blind Cave Fish, "Typhlichthys."

Although some study has been done on the park's obligate cave species, the chances of finding rare species, even species new to science, are very high. The reason for this diversity is due to the caves' isolation: as different animals manage to survive in the incredibly stable underground world, and exploit the food resources they find in their cave, they are also cut off from other similar populations. Responding to conditions that may be specific to their cave, and deprived of the ability to interbreed with other populations, these isolated populations may be fast forwarded in evolution, and develop into unique species. This is a classic case of "island biogeography," first described in the Galapagos Islands by Charles Darwin.

These caves represent islands of isolation, albeit underground. To underscore this diversity, Dr. Julian Lewis, with the help of cavers, and funded by The Nature Conservancy and the U.S. Fish and Wildlife Service, found enough rare species to declare the caves of Fall Creek "a global hotspot of biodiversity." Much more research needs to be done to fully inventory the species of animals found in caves, and then to implement management plans to protect them. With the increasing visitation to the caves, and the threat of pollutants being carried into the cave by the streams from the surface, these sensitive cave adapted species are at extreme risk. We could possibly lose some of the rarest species of animals in the park, and never know it.

Because of this biodiversity, and the inherent danger of caving for novices, staff members of Fall Creek Falls State Park do not advertise the park's caves as being open to the general public, but they do recommend joining a naturalist-led program to learn more about the caves and their unique features.

Overview

For a park of its size, of any park in the country, Fall Creek Falls State Park may have one of the highest levels of biodiversity. This is due to the extreme topographic variation, the presence of microclimates such as bluffs, waterfalls, sinks, and cave entrances. Also contributing greatly to this biodiversity are the numerous caves in the park, and their associated cave animal populations. The diversity of the park is emblematic of the diversity of the Cumberland Plateau, an area that deserves more scientific study, and protection.

Aided by allies such as researchers, cavers, wildflower enthusiasts, The Nature Conservancy, and other groups, park management is challenged by the daunting task of fully inventorying this biodiversity.

Park management must also develop management plans that protect all of these native species, and with the rarest, such as the Virginia Spiraea, the Indiana Bat, and others, try to enhance their populations to keep them from slipping into extinction. If the park management and its allies are successful in this task of protecting and even enhancing this biodiversity, the value of the park will increase manyfold in the decades to come.

In the summer, between Memorial Day, and Labor Day, the park offers programs seven days a week. Many of these programs highlight the park's biodiversity. Drop by the nature center for a schedule of these programs, or to sign up for a naturalist-led program to one of the park's caves. Call 423-881-5708 for more information.

(With a B.S. degree in wildlife biology and an M.S. degree in education Stuart Carroll, Interpretive Specialist 3, heads up the resource management and programming section at Fall Creek Falls State Park. He is a 23-year veteran of Tennessee State Parks.)

Department of Environment & Conservation
401 Church Street, 21st Floor
Nashville, TN 37243-0435
615.532.0109